A Long-run Macroeconomic Model of Slovakia
(Long-term sustainability of the pension system)

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Introduction

The aim of the present study is to provide a long-run analysis of the impact of the second pillar of pension provision on the Slovak economy. The second pension pillar is a fully-funded defined-contribution (DC) scheme joining which leads to an automatic partial opt-out from the public pay-as-you-go (PAYG) system. We analyze several scenarios derived from the most recent legal regulations. Firstly, we design a scenario without a second pillar, when pension provision is assumed to be carried out by the state alone, within the framework of its PAYG scheme. The outcomes of this scenario are compared to the macroeconomic effects of the introduction of the Slovak second pension pillar in its current form, taking into account the latest legislative changes. Following this, we investigate the impact of hypothetical policy changes in Slovakia's pension legislation on annual government budget deficits and government debt.

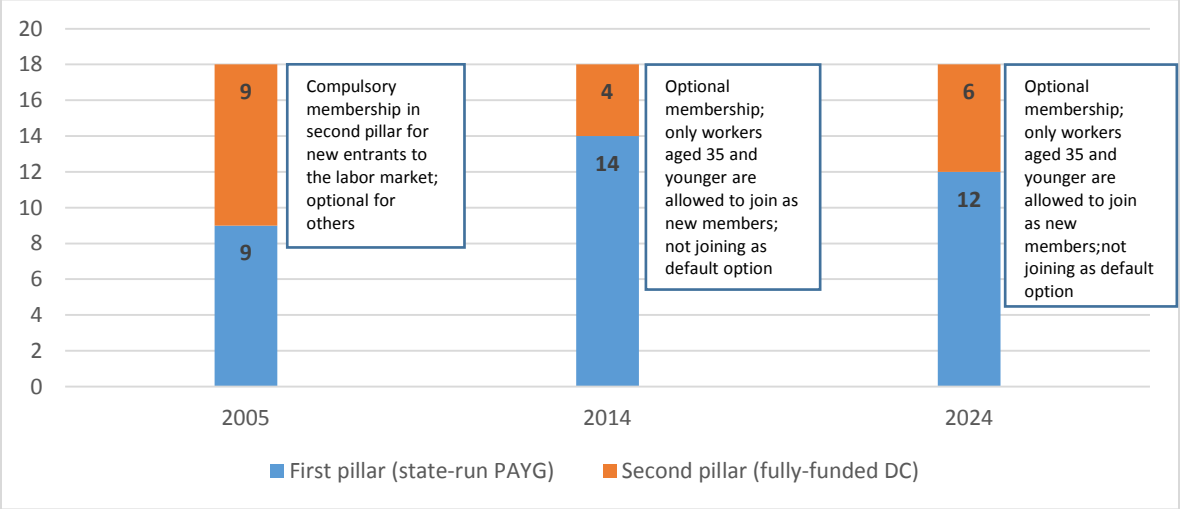
The Slovak Pension System

The Slovak pension system has undergone a number of substantial changes in the past two decades. One of the most important has been its 2005 transformation, when the traditional state-run public defined-benefit (DB) PAYG system has been transformed into a three-pillar system. In the new system, the first pillar of old-age pension provision remains a state-run points-system modelled on the German points-system. By contrast, the second and third pillars are fully-funded DC schemes whose members will receive their pensions in the form of annuities purchased on the free, partially regulated, market. The percentage of covered earnings paid into the second pillar is subtracted from the amount that is to be contributed into the first pillar. In this sense, the second pillar represents an opt-out possibility from the state-run PAYG scheme. The third pillar allows workers to accumulate additional savings on a voluntary basis, on top of the statutory old-age social security contributions into the first and second pillars. This "new" system of old-age pension provision loosely follows the advice given by the World Bank (WB) in its study *Averting the old-age crisis* (World Bank, 1994).

Since its creation, the three-pillar system has also been reformed several times. The most significant among these reform episodes targeted the conditions of joining the second pillar, as well as the division of mandatory contributions between the first and second pillars. The initial

reform, legislated by a center-right government, created a system where both the first and second pillars collected nine per cent of covered income. Until 2008, joining the second pillar was compulsory for new entrants to the labor market, and voluntary for everyone else. As of September 2012, the country's center-left government, still in office, set the division of contributions to 14/4 per cent of covered income for the first/second pillars. However, this division of contributions will gradually change between 2017 and 2024. Second-pillar contributions will increase by 0.25 percentage points per year until six per cent are reached in 2024, while contributions to the first pillar will gradually decrease to twelve per cent of covered income. Finally, the 2012 reform package made membership in the second pillar fully voluntary, making membership available to workers younger than thirty-five. Figure one provides a historical overview of the main characteristics of the Slovak first and second pension pillars.

Figure 1. An overview of the Slovak pension system.

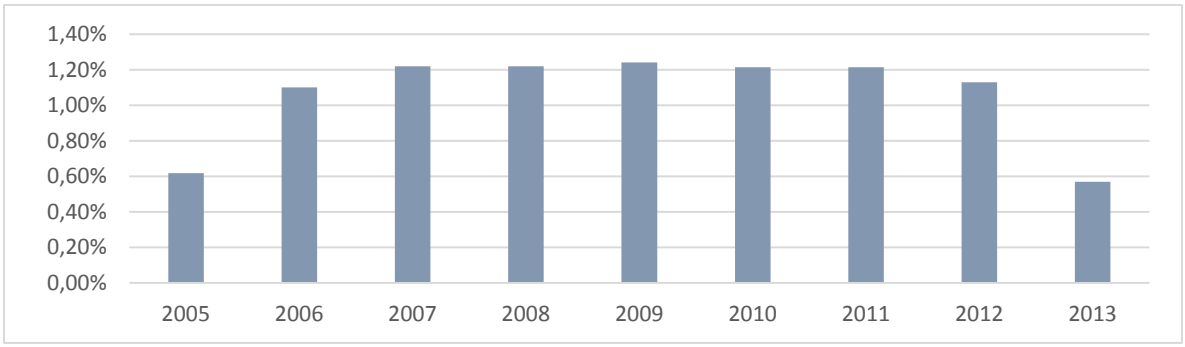


The above account of the development of the Slovak pension system shows that even abrupt changes are rather common in a transition economy's unstable policy environment. In addition, surprisingly little attention has been devoted to analyzing the impact of changes to the pension system on the broader macroeconomic context. Nevertheless, old-age pension belongs to the most significant policy tools of the modern welfare state. Its set-up is likely to influence a number of macroeconomic variables, which deserves the attention of the forecasting profession.

Allowing a partial opt-out from a mature PAYG system causes an immediate decline in the inflow of pension contributions into the state-run PAYG old-age pension system. In a horizon of several decades, this leads to a commensurate decline in workers' pension claims against the state. However, until this phase is reached, the decline in the pension budget's cash flow needs to be covered from other resources. This time inconsistency generates a non-negligible pressure both on the national economy and, ultimately, the political elite (e.g. Drahokoupil and Domonkos 2012). Table 2 shows the development of funding collected in the second pillar in the Slovak Republic. As can be seen, until 2011, the annual mandatory contributions diverted from

the first pillar to the second pillar constituted approximately 1.2 per cent of the GDP. This ratio has significantly declined after the 2012 pension reform that cut second-pillar contributions from nine to four per cent.

Figure 2. Second-Pillar contributions as a percentage of GDP.



Sources: Social Insurance Authority (2012) ; Ministry of Finance of the Slovak Republic (2014); Slovstat (2014)

Approaches to Estimating the Impact of Pension Policies

A specificity of the pension system is that legislative changes often apply to selected cohorts only. Their effects often become visible only in the very long run. A common approach to evaluating the impact of pension, and other social policies on people's well-being is known as generational accounting (e.g. Kotlikoff 1992; Auerbach, Gokhale and Kotlikoff 1994). Generational accounting is a way of comparing taxes payable and transfers receivable by a generation or cohort. While useful for evaluating intergenerational equity, an analysis of the pension legislation using generational accounting does not provide information about the impact of pension-system design on macroeconomic variables.[1] For the purposes of generational accounting, relevant variables, such as expected economic growth, are given exogenously.

Furthermore, a number of studies have investigated the impact of various policy scenarios on the stability of national pension systems in a static framework. Using several macroeconomic scenarios, Égert (2013) analyzes the impact of the weakening of the second pillar in Central and Eastern European countries (CEECs) on national pension finances and achievable replacement rates. In a similar framework, Orbán and Palotai (2005) investigate whether the Hungarian pension system is sustainable and whether the second pillar improves its financial health. The conclusions drawn from these studies suggest that the wide-spread conviction about the superiority of multi-pillar systems may be exaggerated.

[1] In addition, the evaluation of the net tax levied on a cohort also relies on a number of assumptions. Among these, expectations concerning the discount rate and (partly) arbitrary decisions about what social programs are considered as benefits to a certain cohort play a crucial role. For a criticism of generational accounting, see Baker and Weisbrot (1999), Chapter 2.

This being said, one should also consider the limitations of the afore-mentioned studies. These analyses consider several macroeconomic variables of interest, such as the employment rate, real wage growth and labor share in GDP as exogenous inputs. Treating these variables as exogenous does not allow a full understanding of the complex relationships and implications of pension-policy shifts for the national economy as a whole. The rationale behind the introduction of the second pillar is the assumption that, in the very long run, it will allow the state to accumulate smaller total public debt, resistant against demographic changes. Testing whether this is true can be carried out by using a long-run macroeconomic model.

Long-run macroeconomic models have been used for analyzing the impact of aging on employment, economic growth and the sustainability of the social security system in Austria (Baumgartner et al., 2004). The Austrian model has been applied for simulating the macroeconomic impact of various population scenarios. These included a scenario with high productivity growth, a scenario with stable fiscal balance and a number of additional scenarios with alternative rules for pension indexation. Baumgartner et al.'s (2004) simulations follow the state of the Austrian economy until the year 2075. One of the advantages of a long-run macroeconomic model is the ability to capture the multiplicative effects of demographic and policy changes in a dynamic framework.

Model

The macroeconomic model used in this study is the Long-run macroeconomic model of the Slovak Economy (SLMM_IER_SAS). The structure of the model and the majority of its equations are based on the Long-run macroeconomic model of Austria developed by Baumgartner et al. (2004). Elements used in the HERMIN model[2] have also been incorporated into the SLMM_IER_SAS. The SLMM_IER_SAS was modified to some extent, compared to the original Austrian model, in order to capture the specific characteristics of the Slovak Economy. One of these specifics is the multi-pillar pension system.

Following the approach of parameter estimations in the Austrian model, the prevalent majority of parameters of the model are calibrated according to economic theory instead of econometric estimations. Due to short annual time series and the nature of data affected by the transition period, calibration based on economic theory appears more useful. In addition, during the estimation and calibration of the parameters, the "mixed" procedure proposed by Bradley et al. (2003) was also taken into consideration. Bradley et al. (2004) suggest to use simple curve fitting to post data, in case of transition countries with lack of data. This approach is based on using the ordinary least squares method for the curve-fitting followed by minor modifications of the parameter values where deemed necessary (Bradley et al., 2004).

The SLMM_IER_SAS is composed of 7 interrelated blocks which are as follows: households, firms, labor market, income distribution, public sector, social security sector and external trade.

[2] The HERMIN model was developed by Bradley et al. (2003) and used for the evaluation of the impact of European Structural Funds.

This structure has been adopted from the Austrian Long-Run Macroeconomic Model (Baumgartner et al., 2004). The model is based on a Neo-classical framework, with an overlapping-generations structure and forward looking elements (e.g. a two-component consumption function – forward looking part and budgetary constrained part).

The special feature of our model is the multi-pillar pension system composed of a first pillar and a second pillar. The third pillar is not taken into consideration. The design of the multi-pillar pension system is based on a stylized version of the Slovak pension system. One of the weaknesses of this modeling approach is that the distribution of the pension insurance fund to domestic and foreign investments is ignored. Market yields are expected to converge, in the long-run, to the annual GDP growth rate. If Slovakia's GDP growth rate is expected to decline due to demographic aging, the yields of pension funds achieved by investing on financial markets are likely to decline as well. Investing in nations whose demographic development is expected to be more favorable in the coming decades might be a solution to this issue. We expect that these considerations will have an impact on the investment behavior of pension funds. Thus, conservative funds are expected to invest in domestic and foreign government bonds only, while progressive funds are likely to allocate most of savers' money to foreign assets in countries with a favorable demographic situation. Given these considerations, we assume no sizeable increases in domestic investments due to the existence of the second pension pillar. In consequence, the introduction of the second pillar is also not expected to have an impact on crucial macroeconomic variables through the channel of increased domestic investment.

This modeling exercise seeks to investigate the size of government debt to be accumulated due to the introduction of the second pension pillar into the Slovak pension legislation as well as the dynamics of debt accumulation in the decades to come. A considerable pensions-related increase in public debt is expected between 2010 and 2050. Therefore, the preliminary results imply that tax increases are inevitable if serious fiscal and macroeconomic imbalances are to be avoided.

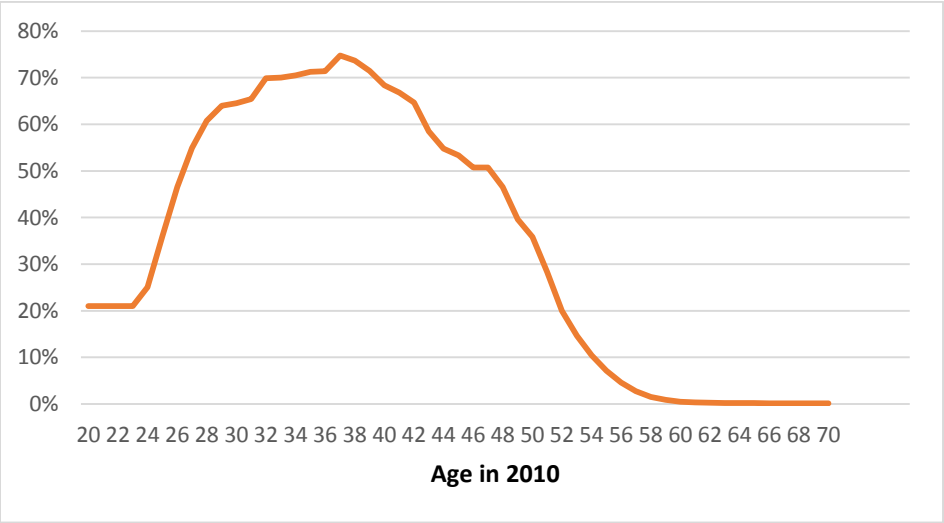
Data

The model uses unpublished data received from the Slovak Ministry of Welfare (Ministry of Welfare of the Slovak Republic, 2013) to estimate the percentage share of second-pillar members of cohorts older than 24 in 2010. Figure 3 shows the percentage of second-pillar membership broken down by cohorts, as of 2010. Membership among cohorts older than fifty in 2010 was rather rare. This is due to a number of factors. At the time when the second pillar was introduced in 2005, an active contributory membership of at least ten years was established as one of the key conditions for drawing a pension from the second pillar. This served as a strong disincentive for older workers to join the second pillar. The legacy of the initial legislative set-up has influenced the age composition of second-pillar members in the long-run. Subsequent legislative changes, i.e. a switch to non-compulsory membership in 2008 and setting not joining the second pillar as default option, have led to a declining number of new entrants among the youngest cohorts of

workers. Therefore, for cohorts that have not reached 25 years by 2010, the membership rate in the second pillar is assumed to be approximately one fifth of the whole cohort size.

For the coming decades, we rely on the assumption that the second pillar stays non-compulsory and that the default option remains not joining the second pillar. Thus, the rate at which new entrants to the labor market join the second pillar will remain around twenty per cent.[3]

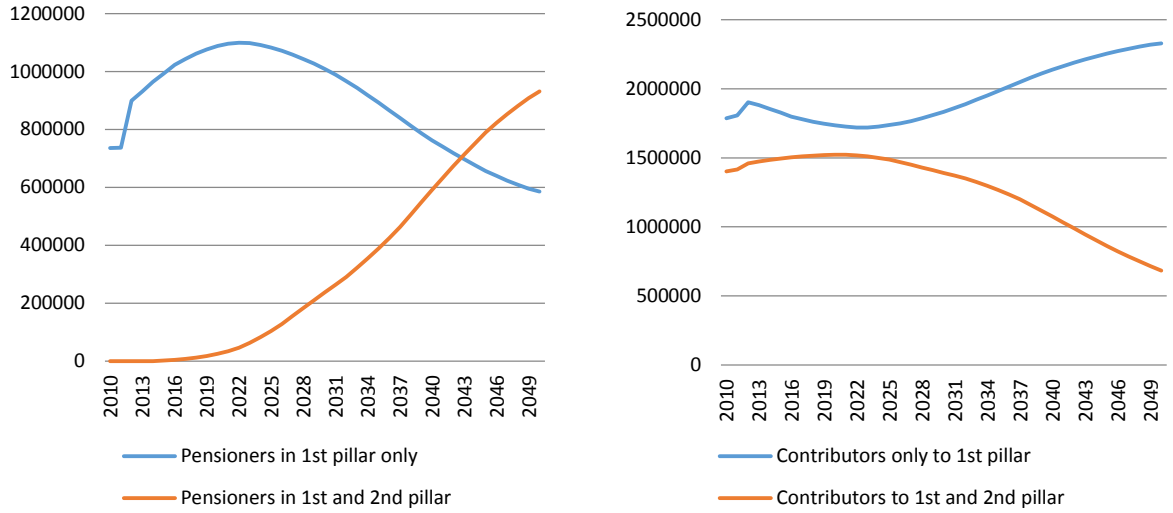
Figure 3. Enrolment in the second pillar, broken down by cohorts



In line with this, the scenario based on the actual state of the second pillar and its legislation assumes that the number of second-pillar members in the Slovak Republic will not grow into the future. In fact, once those in their mid-thirties in 2010 gradually leave the labor market as they retire, the number of second-pillar members will begin to decline. The main reason for this is the afore-mentioned switch to non-compulsory membership. A rather sharp decline in active second-pillar membership may therefore be expected after 2030. Parallel to this development, the number of pensioners receiving their pension at least in part from the second pillar will grow. These trends are shown in Figure 4.

[3] The assumed enrolment to the second pillar according to Figure 3 is used in the Scenario 1 and Scenario 2, however violated in Scenario 3.

Figure 4. Structure of pensioners regarding their participation in the first (1st) and in the second (2nd) pillar



As can be seen, the expected number of pensioners receiving payments from the second pillar will steadily increase over the observed time period, while the expected number of new second pillar members will be smaller than the number of those transferring from active first and second pillar membership to retirement.

Each year, contributors pay a certain percentage of their pension contributions into the second pillar. This percentage is determined by statute law. Table 1 provides an overview of how contribution rates to the second pillar have changed over time and are supposed to develop into the future, based on the provisions of the Slovak pensions act. According to the latest reform, contribution rates are to increase from four per cent between September 2012 and December 2016 to six per cent in 2024, at which point they will be stabilized. The model thus takes into account three variables when determining how much money will be accumulated in the second pillar: the size of total contributions, the number of people enrolled in the second pillar and the percentage contribution payable to the second pillar.

Table 1. The development of second-pillar contributions

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total contributions as % of covered income	18	18	18	18	18	18	18	18	18	18	18
2nd-pillar contributions as % of covered income	9	9	9	9	9	9	9	4	4	4	4
2nd-pillar contributions as % of full contributions	50%	50%	50%	50%	50%	50%	50%	22.2%	22.2%	22.2%	22.2%
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2050
Total contributions as % of covered income	18	18	18	18	18	18	18	18	18	18	18
2nd-pillar contributions as % of covered income	4	4.25	4.5	4.75	5	5.25	5.5	5.75	6	6	6
2nd-pillar contributions as % of full contributions	22.2%	23.6%	25.0%	26.4%	27.8%	29.2%	30.6%	31.9%	33.3%	33.3%	33.3%

For the purposes of the model, we determine the share of contributions going to the first pillar and to the second pillar based on the demographic forecast and savers' contributory profile derived from the latest legislation

Results and discussion

Four simulations are considered in the study. These are composed of three multi-pillar simulations and one single-pillar simulation. The main difference among these scenarios has to do with the institutional set-up of the second pension pillar. Each of the three multi-pillar simulations is compared to the simulation of the one-pillar system, where pension provision is carried out solely by the state through the Slovak state-run PAYG scheme. The multi-pillar system in the first scenario is based on the current state of the pension legislation, currently available population forecasts and the age-structure of persons enrolled in the second pillar as of 2010. The second scenario is similar to the first one, except that the initial half-to-half, i.e. nine-nine percentage points, contributions to the first and second pillars are considered throughout the entire time period analyzed. Finally, the third scenario considers that all entrants to the labor market in age 23 or younger in 2010 will become members of the private funded system.

It is important to note that the amount of total pension transfers received by the pensioners is set to be on the same level for the one-pillar system as for the multi-pillar system, regardless of the particular details of each of the scenarios described above. To provide a better picture about the position of the pension system we compare the overall social contributions to pension transfers. This approach is used because at a certain point of the analyzed time period, the total social contributions are exceeded by pension transfers, which indicates how unsustainable the one-

pillar pension system could be. In other words, even if we used all social contributions collected by the social security system to cover old-age pensions only, we would likely not be able to cover the amount needed for pensions due to the aging of the population. Table 2 summarizes the main features of the three scenarios.

Table 2. Scenarios analyzed.[4]

	Time period	Contribution to the second pillar	Contribution to the first pillar	Age structure of second-pillar members
Scenario 1	**2005-2012**	9 per cent	9 per cent	Enrolment in the second pillar based on the age distribution of members in 2010(see Figure 3)
	2012-2016	4 per cent	14 per cent	
	2017-2024	Linear shift from 4 per cent to 6 per cent, by 0.25 percentage points/year	Linear shift from 14 per cent to 12 per cent, by 0.25 percentage points/year	
	2024 onwards	6 per cent	12 per cent	
Scenario 2	**2005 onwards**	9 per cent	9 per cent	Enrolment in the second pillar based on the age distribution of members in 2010(see Figure 3)
Scenario 3	**2005-2012**	9 per cent	9 per cent	Enrolment in the second pillar based on the age distribution of members from 2010 (see Figure 3) and with the assumption that cohorts 23 and younger in 2010 will join the second pillar to 100 per cent.
	2012-2016	4 per cent	14 per cent	
	2017-2024	Linear shift from 4 per cent to 6 per cent, by 0.25 percentage points/year	Linear shift from 14 per cent to 12 per cent, by 0.25 percentage points/year	
	2024 onwards	6 per cent	12 per cent	

[4] Simulations have been run in the EViews environment, implementing deterministic simulation with dynamic solution, using the Gauss-Seidel solution algorithm and constant levels for endogenous variables as terminal conditions.

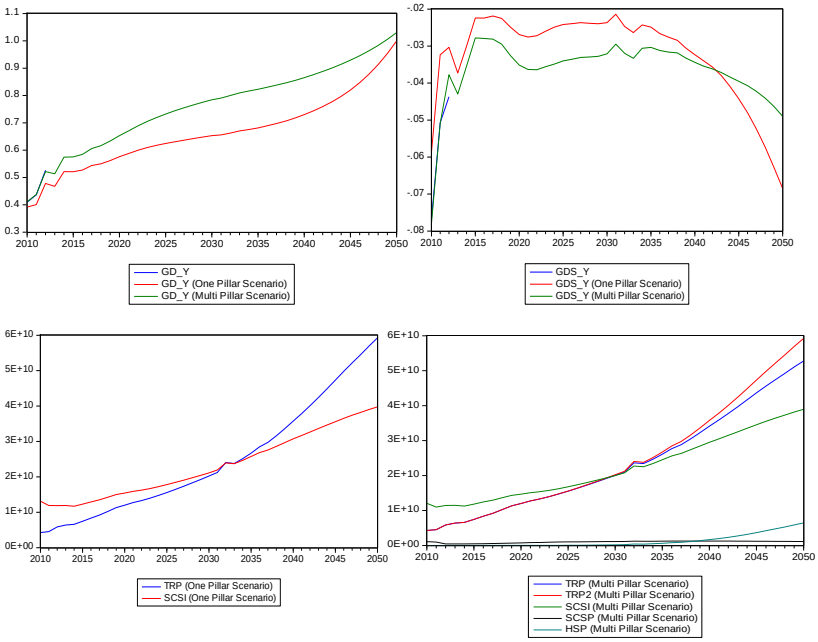
Scenario 1

The first variable we focus on is the annual nominal surplus or deficit of the public sector relative to the annual GDP at current prices (see Figure 5, variable "GDS_Y"). Due to the settings of the model, the difference between the government revenues under the two institutional conditions analyzed is immediately translated into government surplus or deficit.[5] Therefore, from the first simulated period onwards, the difference in the development of annual budget balances under a one-pillar system and a multi-pillar system is substantial, reaching 1.93 per cent of nominal GDP in favor of the one-pillar system. After the initial shock in 2010, the difference stabilizes around 0.7 per cent of GDP, still in favor of the one-pillar system. The difference between the budget deficits under the two systems compared starts to diminish in 2036. After this simulated period, both systems converge in the amount of resulting deficit of public finances until the breakeven point of 2042/2043, when the relative annual deficits under the two systems reach approximately 3.71 per cent. Beyond this turning-point, the difference is in favor of the multi-pillar system, leading to deficits of 6.85 per cent and 4.9 per cent of GDP, for the one-pillar and the multi-pillar system, respectively. Finally, in 2050, the deficit of the two-pillar system is smaller by 1.95 per cent of GDP than that of the one-pillar system.

As a result of the differences in the deficits of public finances under the two pension systems, the annual public debt relative to the annual GDP at current prices (see Figure 5, variable "GD_Y") differs too. Public debt changes rapidly in the first years, reaching a difference of 4.6 per cent of GDP by the year 2013, in favor of the one-pillar system. The growth in the difference in public debt levels was subsequently stable, following an approximately linear trend and culminating in the year 2035 at 14.16 per cent of GDP. At this point, the corresponding share of the public debt relative to the annual GDP was 68.14 per cent and 82.3 per cent for the one-pillar and the multi-pillar system, respectively. For the subsequent periods, the relative public debts in the two systems have converged up to the final year 2050, when the difference in government debt reached under the two institutional schemes was 3.07 per cent of GDP, still in favor of the one-pillar system. The corresponding levels of public debt relative to the country's GDP in the final year were 99.95 per cent and 103.02 per cent for the one-pillar and the multi-pillar system, respectively. The root of the growing deficits in both cases may be partially traced back to the imbalance of the social system, for which the expenditures exceed the contributions. In case of the one-pillar system, even the total annual contributions of the social system will not be enough to cover the annual transfers to pensioners after 2031 (as can be seen on Figure 5, variable "TRP" for transfers to pensioners and variable "SCSI" for social contributions at the disposal of government). The pension liabilities of the state decline in the case of the multi-pillar system, since a portion of the expenses on pensions is borne by the private fully-funded second pillar. This transition of the pension burden subsequently results in lower deficits in the future and thus convergence of the public debts under the two systems.

[5] The model is set to balance the difference in the income and expenditure of the social security system as well as in the public finances via the increase of public debt. This is more straightforward compared to the common view, where the negative imbalances of the social system are topped up by the government and the government consumption is subsequently translated into public debt. Nevertheless, we believe that the final outcome of the two approaches is the same.

Figure 5. Results of the first scenario



Source: Authors' own computation EViews

Note: GD_Y= government debt (as % of GDP); GDS_Y=government annual deficit (as % of GDP); HSP= transfers to pensioners from the second pillar; SCSI= total social-security contributions collected by the government; SCSP= statutory contributions to the second pillar; TRP= transfers to pensioners from the first pillar; TRP2= total pension payments from both pension pillars.

Scenario 2

For the purposes of the second simulation, contribution rates are considered to be fixed at nine per cent of covered income for both the state-run first pillar and the private funded second pillar. Given that the rates are the same as in Scenario 1 for the first years of the simulation, there is hardly any change up to the year 2012. After 2012, the nine-per cent contribution rate into the second pillar remains and the multi-pillar system is thus more expensive from the perspective of public finances than it is in Scenario 1. To illustrate the additional costs in terms of public sector deficit, the difference between the public deficits under the two systems expressed in percentages of nominal GDP (see Figure 6, variable GDS_Y) has stabilized at 1.45 per cent of GDP in favor of the one-pillar system. The convergence in the deficits of the two systems starts sooner for this scenario. The difference between the budget deficits under the two systems is noticeably diminishing from 2030 until the breakeven point of 2044/2045 is reached. Following the year 2045, the multi-pillar system produces a smaller deficit than the one-pillar system and thus the difference is again growing up to the final year 2050, when it reaches 1.64 per cent of GDP. The annual government deficit in 2050 reaches 6.85 per cent and 5.21 per cent for the one-pillar and multi-pillar system, respectively. Because of the greater difference between the deficits of the systems, the difference between the public debts relative to the annual GDP (see Figure 6, variable GD_Y) accumulated under the two systems is also greater than in case of the first scenario. By the year 2013, the difference between the relative debts reaches 6.48 per cent of

GDP in favor of the one-pillar system. Later the difference between the two systems monotonously grows, reaching the value 24.08 per cent of GDP in the year 2035 and peaking in 2037 at 24.23 per cent of GDP in favor of the one-pillar system. Public debt in 2037 reaches 69.74 per cent and 93.96 per cent of annual GDP for the one-pillar and the multi-pillar systems, respectively. In the following years the difference between the relative debt levels diminishes, reaching 13.93 per cent of GDP in favor of the one-pillar system in 2050. By this year, the public debt relative to the annual GDP is at 99.95 per cent for the one-pillar system and 113.88 per cent for the multi-pillar system.

Considering the shifts of the social security system, the case of the one-pillar system is unchanged compared to the previous scenario. On the contrary, the multi pillar system significantly changes. Due to higher contributions to the second pillar, the share of pensions from this source is also larger on savers' full pension. This eases the burden on public finance in the last third of the period observed. Consequently, a greater part of the pension transfers may be shifted to this source and unburden the state-run first pillar. As can be seen in Figure 6, the difference between the transfers to the pensioners from the first pillar and the overall transfers to the pensioners yields HSP, which is defined as transfers to pensioners from the second pillar. This indicator grows over time. Thus, in the year 2050, 6.88 billion Euros are transferred from second pillar to the pensioners, which is equal to 11.61 per cent of total pension transfers from all sources. Considering the revenue side of the multi-pillar system in the conditions of the second scenario, the total social security contributions collected by the state reach an approximate value of 18 billion Euros in the fiscal year 2027. Until 2027, the total revenues of the social security system would be able to cover at least old-age pensions, but leaving no funding for any other social security program, such as unemployment protection or health care. However, after this time point, not even the total amount of social security contributions would be enough to meet the financial needs of the first pillar of old-age social security. As can be seen in Figure 6, when the contributions reach 19.4 billion Euros and pension expenditures are 20 billion Euros.

Figure 6. Results of the second scenario

Source: Authors' own computation in EViews

Note: GD_Y= government debt (% of GDP); GDS_Y=government annual deficit (% of GDP); HSP= transfers to pensioners from the second pillar; SCSI= total social-security contributions collected by the government; SCSP= statutory contributions to the second pillar; TRP= transfers to pensioners from the first pillar; TRP2= total pension payments from both pension pillars.

Scenario 3

Scenario 3 is an extreme case, assuming that all entrants to the labor market in age 23 or younger in 2010 will become members of the second pillar. This change will have an effect on the whole simulated time span (2010 – 2050). Due to the significant shift in social contributions, a lack of funding for the first pillar causes imbalances in the social security system of Slovakia, which may be demonstrated by the fact that social contributions collected by governmental institutions are not enough to cover pension expenditures since 2026/2027. The effect of the lack of contributions is also visible on the deficit of public finances expressed in per cent of the annual GDP (see Figure 7, variable GDS_Y). This indicator reaches 8.1 per cent in 2010, creating a difference among the deficits under the two systems. In fact, the second-pillar implementation indicates an annual deficit larger by 2.23 per cent of GDP than the government deficit under the one-pillar scheme. The difference between the deficits under the two institutional set-ups subsequently stabilizes around 1.6 per cent of GDP and starts to visibly converge after 2039, up to the final period. In 2050, the relative deficit is 6.85 per cent and 6.92 per cent for the one-pillar and the multi-pillar systems, respectively.

As in the two scenarios, the pension-system related difference in the annual deficits of public finances also results in a non-negligible difference in public debt. Since the deficit is higher for the multi-pillar system for the entire time span analyzed, also public debt in percentages of annual GDP (see Figure 7, variable "GD_Y") is higher for the multi-pillar system. In 2013, the difference between public debts under the two policy set-ups is 5.54 per cent of GDP in favor of the one-pillar system. The difference between the debt levels under the two systems subsequently grows along an approximately linear trend, reaching 25.5 per cent of GDP in 2035. The corresponding levels of relative public debt are 68.14 per cent and 93.64 per cent for the one-pillar and multi-pillar systems, respectively. The difference in the debt levels is greatest in 2045, at 29.22 per cent of GDP in favor of the one-pillar system. After this period, the relative public debts under the two institutional set-ups start to converge. In 2050, the level of the debt relative to the GDP is 99.95 per cent for the one-pillar system and 127.38 per cent for the multi-pillar system, creating a difference of 27.43 per cent of GDP in favor of the one-pillar system.

As mentioned earlier, an extreme shift towards the second pillar leads to a greater gap in the public finances. However, this very shift yields a smaller burden for the social system in the more distant future (as can be seen in Figure 7). In 2050, the second pillar covers pensions worth 6.44 billion euros, which amounts to 10.87 per cent of all pension transfers. Considering again the corresponding revenue side of the first pillar, by the year 2030, total social contributions at disposal of public institutions are 19 billion Euros. This amount is exceeded by the need of the pension transfers from the first pillar, which reach 20 billion Euros.

Figure 7. Results of the third scenario

Source: Authors' own computation in EViews

Note: GD_Y= government debt (% of GDP); GDS_Y=government annual deficit (% of GDP); HSP= transfers to pensioners from the second pillar; SCSI= total social-security contributions collected by the government; SCSP= statutory contributions to the second pillar; TRP= transfers to pensioners from the first pillar; TRP2= total pension payments from both pension pillars.

Conclusions

The aging of the population may have a significant impact on the future balance of public finances. It is naive to believe that the current set-up of Slovak pension system could deal with the expected aging after 2035 without any serious problems. As a reaction to this upcoming issue, the multi-pillar pension system was introduced in 2005. This policy step split the experts and politicians into two groups, one being strongly in favor of the second pillar, the other one being against it. The opponents argue that the introduction of the public pension fund was rather a political issue and that it will never satisfy the expectations attached to it. Nevertheless, it will generate costs for the generation living today. In other words, the costs during the transition period will exceed the benefits from the pension reform, and will put enormous pressure on public finances today. The proponents believe that the multi-pillar system may have the potential to stabilize public finances when aging occurs. Another question is how long it will take for the costs paid for the introduction of the multi-pillar system to return. Taking an unambiguous position on this issue is rather difficult, due to the unstable political willingness of keeping, changing or removing the multi-pillar pension system.

As a consequence of this instability, the second pillar was several times changed. Contribution rates to the private system were decreased from nine per cent to four per cent, with some prospects of a gradual increase up to six per cent. These changes led to a decline in the number of persons joining the new system. As our analyses showed, this type of reform will gain positive effects after several decades. However, dealing today with future problems is not important for every politician to the same extent. This resulted in several changes of the parameters of the system, hence making the quantification of expected result very complicated.

As has been shown, every given setting of the second pillar is at the beginning more costly for the government than sticking to the one-pillar pension system. Such result is difficult to reject, since the reduction of the social contributions caused by the second pillar is not immediately met

with compensation of the current pensioners and hence opens a gap in the social system, which has to be dealt with through government consumption.

Summarizing the first scenario, the strengths and weaknesses of the multi-pillar system compared to the one-pillar system are fairly visible. The positive effect is that the second pillar lifts some of the burden imposed by the pension transfers in the future. However, its major shortcoming is the sapping of some of the pension contributions, which would otherwise serve to cover old-age social security transfers. Thus, a gap in the state budget is created, which leads to increased public debt. Nevertheless the imbalance of the state-run social-security system would inevitably rise due to the aging of the population.

Under the settings analyzed in Scenario 1, the multi-pillar system seems to be almost neutral in the horizon of forty years from the perspective of public indebtedness. In comparison to the first scenario, the second scenario assumes more contributions to the second-pillar and thus a greater gap in public finances in the initial years, as well as a greater uplift of the burden in the final years of the analysis. Therefore, the resulting public debt in 2050 is greater by 10.86 percentage points than in the previous scenario, but, in return, the share of payments from the second pillar on total pensions is greater by 0.74 percentage points than in the first scenario. A similar picture arises when, instead of a greater share of contributions to the second pillar, more workers are considered to have joined the second pillar (Scenario 3). In such a scenario the public debt rises even higher than in the second scenario, and the turning point, when deficit is greater for the one-pillar system than for the multi-pillar system, comes after the final year 2050. Therefore, the positive effects of the second pillar are not as visible as in the previous cases. Hence, by the final year of the simulations, the public debt is greater by 24.36 and 13.5 percentage points than in the first and second scenarios, respectively.

The simulations based on a long-run neoclassical model showed that forecasting the development of public finances when we are confronted with an aging population and changing pension system is a rather complicated issue. The long-run impact that is likely to appear after several decades increases the uncertainty of the results. The results should be interpreted in light of these facts. Conclusions should be developed according to the future expected trends instead of relying exclusively on exact numbers.

The current set-up of the multi-pillar pension system seems to be very moderate in terms of future expected results. The changes in the level of contributions and the non-compulsory access approach decreased the number of participants and the size of the funded system to such an extent, that the future expected stabilization of public finances when strong aging occurs will be very limited. Without a second pillar, public finances are closer to a balanced state budged today, but this raises the question how to face the demographic challenges of the future. Increasing taxes and social contributions may be one of the options, so the costs of aging will be financed by future generations, instead of the aging generation itself. Taking all this into account, we can conclude that providing a meaningful and fair answer to demographic pressures Slovakia is to face in the coming decades seems to be a very challenging task.

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